Please make a copy of this document and include this in your GitHub repository for your submission, using the tag #AndroidDevChallenge

Tell us what your idea is.

Describe in 250 words what the feature or service will do and how you'll use Machine Learning to push the bar:

Some people have trouble reading facial expressions due to Autism or Asperger's. This difficulty in reading facial expressions can lead to relational issues, which can then affect many different aspects of their lives. Forming new relationships may be harder, and they may be misunderstood by their peers or their colleagues. At home, their family members may find it difficult to connect with them.

My idea is to utilize on-device machine learning to quickly read the emotions of another person. There will be a live camera view, where the camera is pointed at another person's face. The emotions of that person is displayed via text on the screen in real time. Augmented reality can be used to display the emotions in other ways. For instance, for kids, an animated cartoon character can be displayed on the person's shoulder. Or, there can be environmental effects such as rain or snow, that may mirror the person's emotions.

An extension of this idea is to help people train their brains to read emotions on their own and to mirror their own facial experiences to match that of the other person. For this, both the front-facing and back-facing cameras can be used. On the screen, the user is prompted to match the emotions of the other person. A single-player, gamified version of this app will allow the user to train on their own.

I believe that such an app would be useful and will enrich the lives of those with this disability.

Tell us how you plan on bringing it to life.

Describe where your project is, how you could use Google's help in the endeavor, and how you plan on using On-Device ML technology to bring the concept to life. The best submissions have a great idea combined with a concrete path of where you plan on going, which should include:

- *(1) any potential sample code you've already written,*
- *(2) a list of the ways you could use Google's help,*

- *(3) as well as the timeline on how you plan on bringing it to life by May 1, 2020.*

(1) The sample code is in this repo: https://github.com/cliveleehere/SmileHelper

Right now, it's using CameraX and ML Kit firebase for smile detection. In the final version, I'm going to switch out CameraX with ARCore and ML Kit for another machine learning model.

(2) The current ML Kit's Firebase face detection implementation only has 'smiling' classification. I could use some help with finding data & training a new machine learning model. I am leaning towards using AutoML Vision Edge, but I haven't used it before so I'm not 100% sure whether that's the direction I should go forward with.

Also, for displaying emotions to the user, I'm planning to display cute animals, and use some free 3d models from Poly. If Google would like to provide 3d models and animations, I think that would look fantastic!

(3) Rough timeline:

November & December - Create app with camera preview. Take some online courses on machine learning.

January & February - Train model & hook it up to app

March - Add 3d models & environmental effects

April - the 2 player mode (show both the front and back cameras)

Stretch goal - Single player selfie mode.

Tell us about you.

A great idea is just one part of the equation; we also want to learn a bit more about you. Share with us some of your other projects so we can get an idea of how we can assist you with your project.

I'm an android engineer by day. I work at Wayfair, and I work on the augmented reality / 3d team, and work with ARCore / Sceneform. I also work on my personal apps by night. My personal website is at https://cliveleehere.github.io/ , which lists some of my apps.

I made a version of this at a hackathon, using Unity and Hololense. Because the machine learning model was on the cloud (using Face API https://azure.microsoft.com/en-us/services/cognitive-services/face/), the performance was highly dependent on the network latency. That version of the app lives in https://github.com/RealityVirtually2019/8-smilehelper

Due to the latency and the expensive hardware requirement, I want to bring this to Android, which would make this app accessible to a lot more people!

Next steps.

- Be sure to include this cover letter in your GitHub repository
- Your GitHub repository should be tagged #AndroidDevChallenge
- Don’t forget to include other items in your GitHub repository to help us evaluate your submission; you can include prior projects you've worked on, sample code you've already built for this project, or anything else you think could be helpful in evaluating your concept and your ability to build it
- **The final step is to fill out this form to officially submit your proposal.**